REMARKS

The specification is amended above as requested.

The rejection of independent claims 37, 40 and 43 (and, thus, the other claims) under 35 USC 102 for anticipation by the cited Satorius patent is traversed by the "changing [of] an amplitude and phase of the incident light in accordance with the specific amplitude AND the specific phase defined in the cell" (emphasis added) of each of these claims. The Satorius patent neither discloses this, whereby the rejection is traversed, nor suggests it, whereby the claims are not obvious from the patent, either.

We have carefully studied Satorius and concluded that Satorius does not disclose a cell with both of a specific amplitude and a specific phase defined, though the Examiner mentioned that a specific amplitude and a specific phase are defined in each individual cell of Satorius.

As shown in FIG. 1 of Satorius, Data Layer 72 includes a plurality of pages (hexagons) and data are stored in respective pages. The stored data on Data Layer 72 is read out on Photodetector Array 140 through Lenslet 92, Transform Plane Shutter Array 100, Diffractive Corrector 110 and Reimaging Lens 120 by irradiating light from Light Source 50. Transform Plate Shutter Array 100 has a function to select a particular page to open a window corresponding to the particular page to be read out. The examiner pointed out that Data Layer 72 corresponds to the optical element of the present invention. FIG. 2 shows a plan view of Data Layer 72 which includes a plurality of Page Areas 78 (hexagons). One of Page Area 78 (Data Page 74) is illustrated in FIG. 2A which includes a plurality of Phase Altering Storage Pixels 76 (tiny hexagons). One of Pixel 76 is illustrated in FIG. 2B. The Examiner pointed out that Pixel 76 of Satorius corresponds to a cell of the present invention, though we do not agree with that opinion.

It is very important to know how to store data on Data Layer 72. FIG. 3 shows Recording Projection System 150 to store data on Data Layer 72. In order to store data, Amplitude Pattern Object Plane 154, which is controlled by Amplitude Pattern Controller 152, is prepared. There are a plurality of pages (hexagons) on Amplitude Pattern Object Plane 154 and each page contains Amplitude Pattern of Information 156 as shown in FIG. 3A. Amplitude Pattern of Information 156 consists of a plurality of Amplitude Pixels 158 (tiny hexagons) which has a digital value of 0 or 1 (in the figure, white or black). According to the description in lines 38-41 of column 7, in order encoding schemes where more information is to be stored, the information is represented by Amplitude Pixels 158 as encoded on a gray scale instead of black and white. Anyway, "Amplitude" is represented by Amplitude Pixels 158. Amplitude Pattern of Information 156 on Amplitude Pattern Object Plane 154 is projected on Data Layer 72 through Projection Lens 160 and Transmission Diffractive Grating 170 which has modulation angle θ. If Data Layer 72 is made of photosensitive material, information on Amplitude Pattern Object Plane 154 is stored on Data Layer 72 as Phase

Altering Storage Pixel 76 shown in FIG. 3B. In other word, information of Amplitude Pixel 158 (tiny hexagon) shown in FIG. 3A is transferred to Phase Altering Storage Pixel 76 (tiny hexagon) shown in FIG. 3B. The important thing is that information is represented by "Amplitude" on Amplitude Pixel 158 in FIG. 3A and is represented by "Phase" on Phase Altering Storage Pixel 76 in FIG. 3B. That is, "Amplitude information" on Amplitude Pixel 158 is converted to "Phase information" on Phase Altering Storage Pixel 76.

The Examiner pointed out that a specific amplitude and a specific phase are defined in each individual cell (Amplitude Pixel 158 and Phase Altering Storage Pixel 76) which corresponds to a cell of the present invention. However, Amplitude Pixel 158 is arranged on Amplitude Pattern Object Plane 154 and Phase Altering Storage Pixel 76 is arranged on Data Layer 72 which is a physically different medium from Amplitude Pattern Object Plane 154. On Amplitude Pixel 158, only "Amplitude" is defined and on Phase Altering Storage Pixel 76, only "Phase" is defined. On neither Amplitude Pixel 158 nor Phase Altering Storage Pixel 76, both of a specific amplitude and a specific phase are defined. The important feature of the present invention is that both of a specific amplitude and a specific phase are defined on the same physical medium.

As mentioned above, on Data Layer 72 of Satorius, only phase is defined and amplitude is not defined. Phase Altering Storage Pixel 76 has a function to alter phase of transmitting light but not to alter amplitude of the same. This is apparent from the specification of Satorius as follows.

In column 5, lines 15-19, the description such that "As shown in FIGS. 1 and 2, the photorefractive read-only optical memory apparatus using phase, frequency and angular modulation 40 reads information stored as phase altering storage pixels 76 on data layers 72." is found. This description means that modulation 40 has a function to modulate phase, frequency and angular, but not amplitude. This is because amplitude modulating information is not stored on Data Layer 72.

In column 7, lines 6-11, the description such that "The data layers 72 are constructed of photosensitive materials capable of storing light altering characteristics such that the phase of transmitted light is altered, in accordance with the information coding of a phase altering storage pixel 76, when passing through that phase altering storage pixel 76." is found. This description means that Data Layer 72 has a function to alter phase of transmitted light based on the stored phase information. There is no description that Data Layer 72 has a function to alter amplitude of transmitted light based on the stored amplitude information. This is because amplitude information is not stored on Data Layer 72.

In column 7, lines 52-54, the description such that "In so doing, the amplitude pattern of information 156 is recorded as phase altering storage pixel 76 modulated with the selected carrier frequency and carrier angle." is found. This description means that amplitude pattern of information 156 is converted to phase pattern of information to be recorded on Data Layer 72 as Phase Altering Storage Pixel 76. In other words, Phase Altering Storage Pixel 76 has a function to carry out phase, frequency and angular modulation, but not amplitude modulation.

In column 6, lines 1-5, the description such that "The data layers 72 can be manufactured using many of the processes used to create transmissive holograms." is found and in column 6, lines 20-37, the detailed explanation for recording information on a photopolymer medium which becomes to have phase modulation properties. Also, in column 6, lines 38-42 and 55-63, it is explained that a relief image can be obtained by using bleaching technique on a silver halide emulsion film that has been exposed by an amplitude modulation representation of the information to be recorded. The obtained relief image is made of inequality of a surface of the medium and causes a difference of light path length of transmitted light so that phase is modulated. In column 6 lines 64-65, the description such that "non-tanning bleaches produce internal refractive index changes within the emulsion, rather than relief images." is found. This description means that there is distribution of internal refractive index on the recorded medium so that phase is modulated.

As a matter of fact, the technique for recording "information of amplitude distribution" on a medium as "information of phase distribution" is well known. We enclose herewith two documents describing such a technique (Fundamentals of Optics, JENKINS/WHITE, McGraw Hill, p. 665, lines 10-11 and EP 0195327). The method for creating Data Layer 72 described in Satorius is based on the above well-known technique and, therefore, the obtained Data Layer 72 includes information of phase distribution but not information of amplitude distribution.

In conclusion, an optical element consisting of a set of a plurality of three-dimensional cells wherein both of a specific amplitude and a specific phase are defined in each individual cell, is not disclosed in Satorius.

References are attached in support of reasons for patentability, whereby no Statement or fee for an Information Disclosure Statement is required. Nevertheless, the Examiner may cite the references and, to facilitate this, a form 1449 identifying the references is attached.

Reconsideration and allowance are, therefore, requested.

Respectfully submitted,

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